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(54) **EVENT NOTIFICATION SYSTEM AND METHOD**

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G06F 13/00 (2006.01)

(52) **U.S. Cl.** **710/22**; 710/8; 710/36; 710/40; 710/62

(58) **Field of Classification Search** ..... None
See application file for complete search history.

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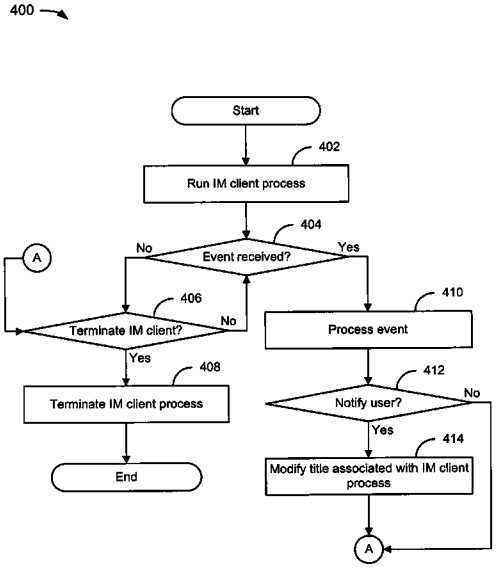
(57) **ABSTRACT**

A technique for user notification involves modifying a title associated with a process to include information about an event that calls for user notification. A method according to the technique may include running a process, processing an event, generating a string of characters that includes information associated with the event, and displaying the string of characters as a title associated with the process. A system constructed according to the technique may include a client, a title array, an event processing engine, and a title provisioning engine.

5 Claims, 11 Drawing Sheets



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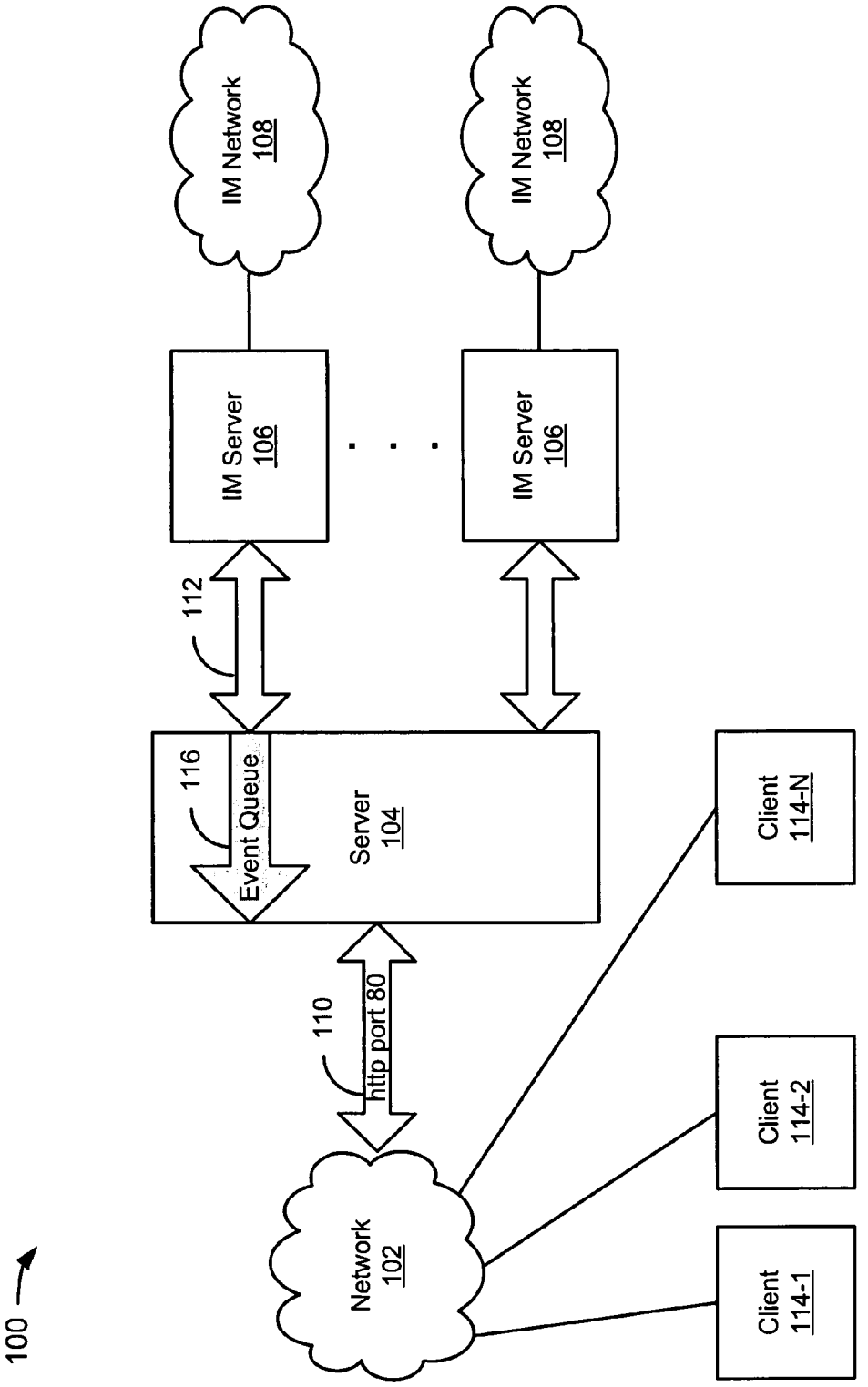
100
Network 102
Client 114-1
Client 114-2
Client 114-N
110
http port 80
Server 104
116
Event Queue
112
IM Server 106
IM Server 106
IM Network 108
IM Network 108

FIG. 1

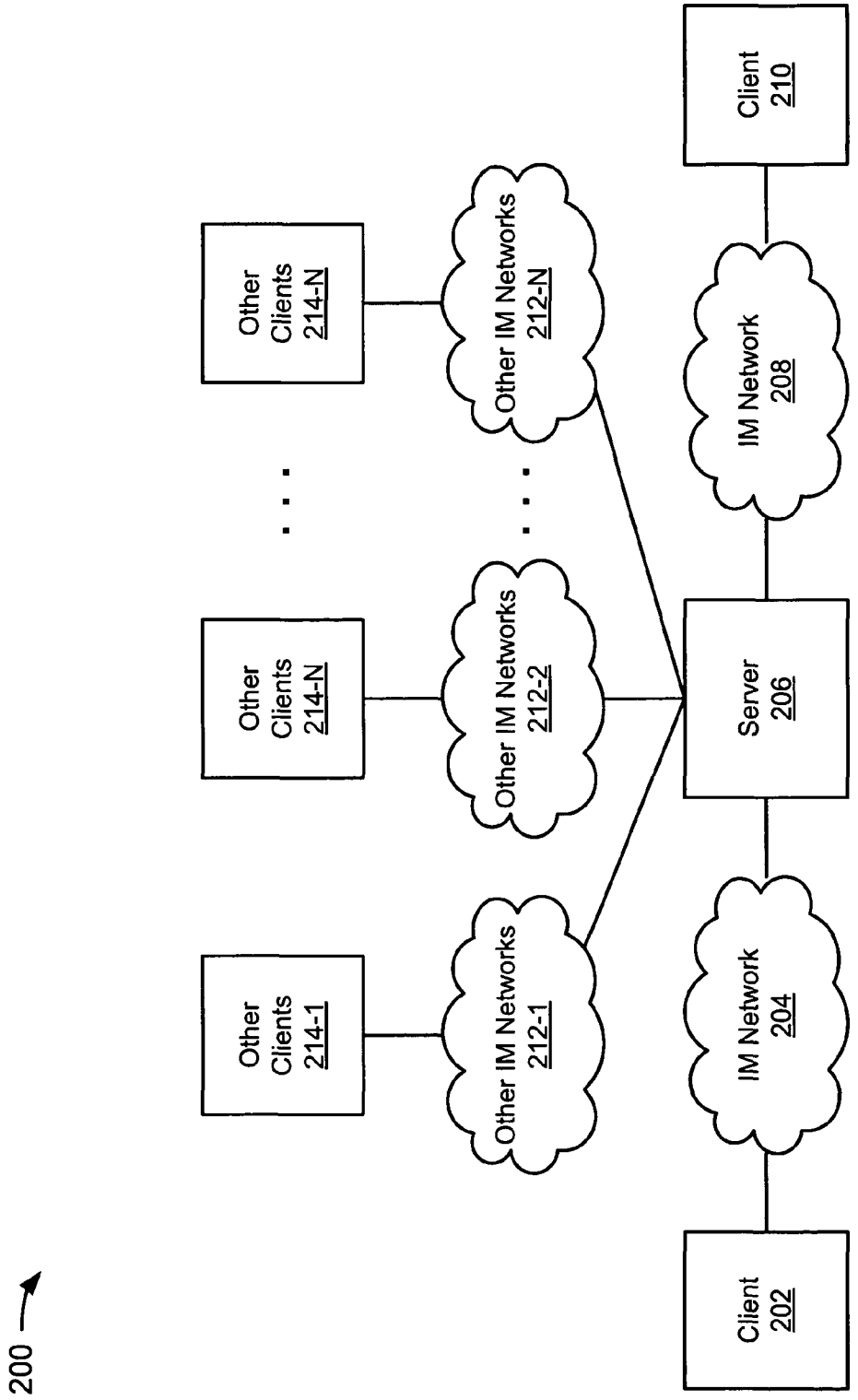
200
Client 202
IM Network 204
Server 206
IM Network 208
Client 210
Other IM Networks 212-1
Other IM Networks 212-2
Other IM Networks 212-N
Other Clients 214-1
Other Clients 214-N
Other Clients 214-N

FIG. 2

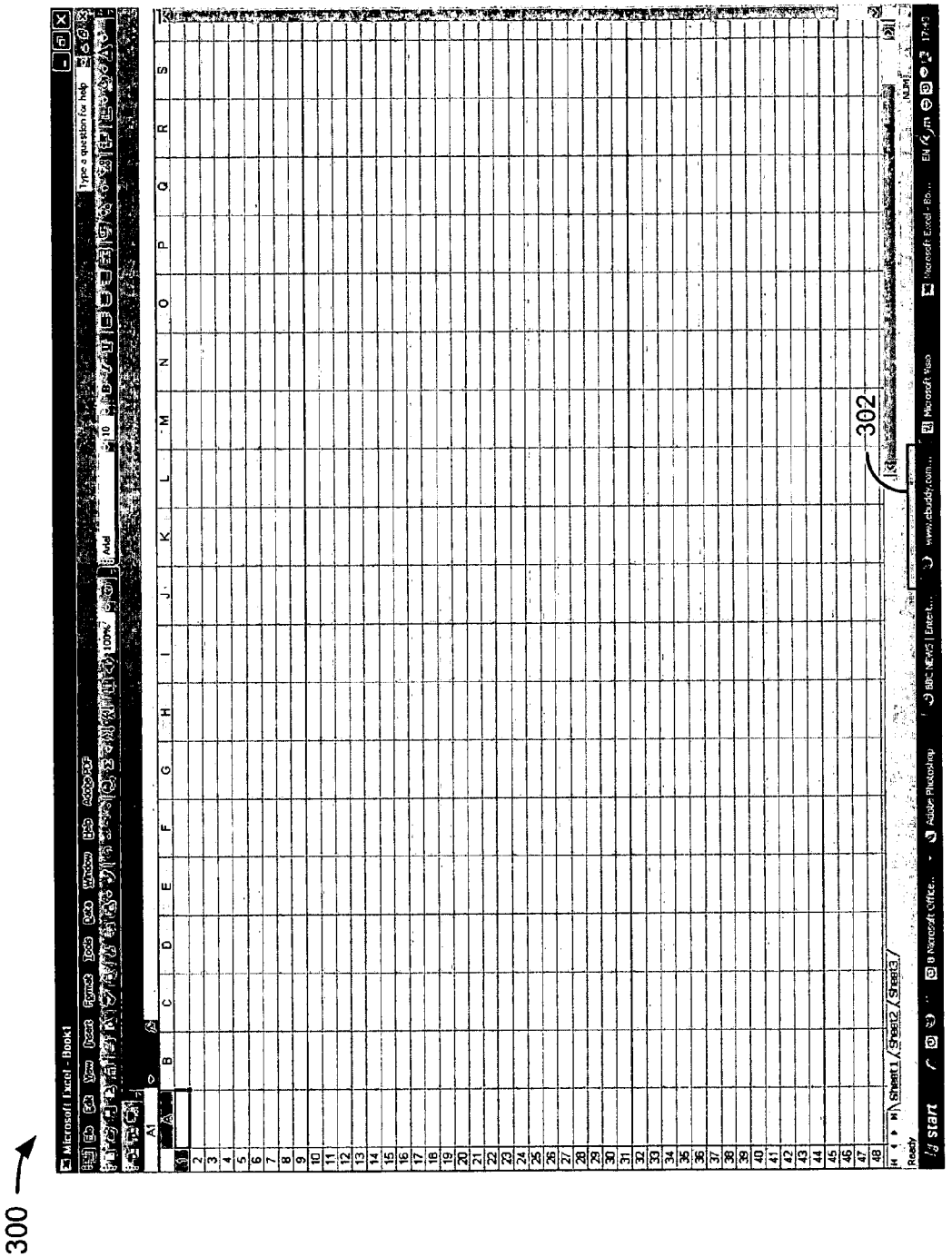

FIG. 3A

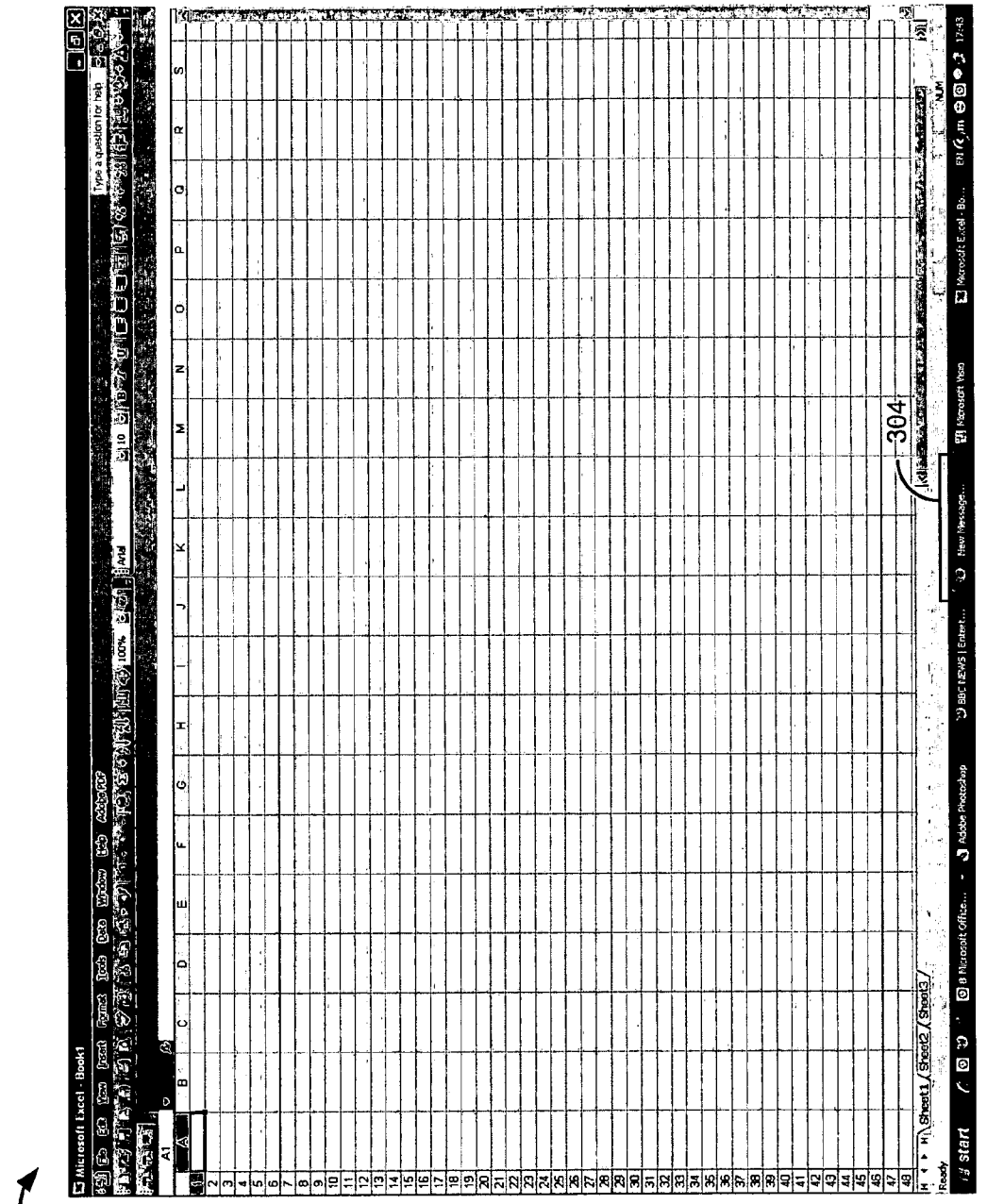

FIG. 3B

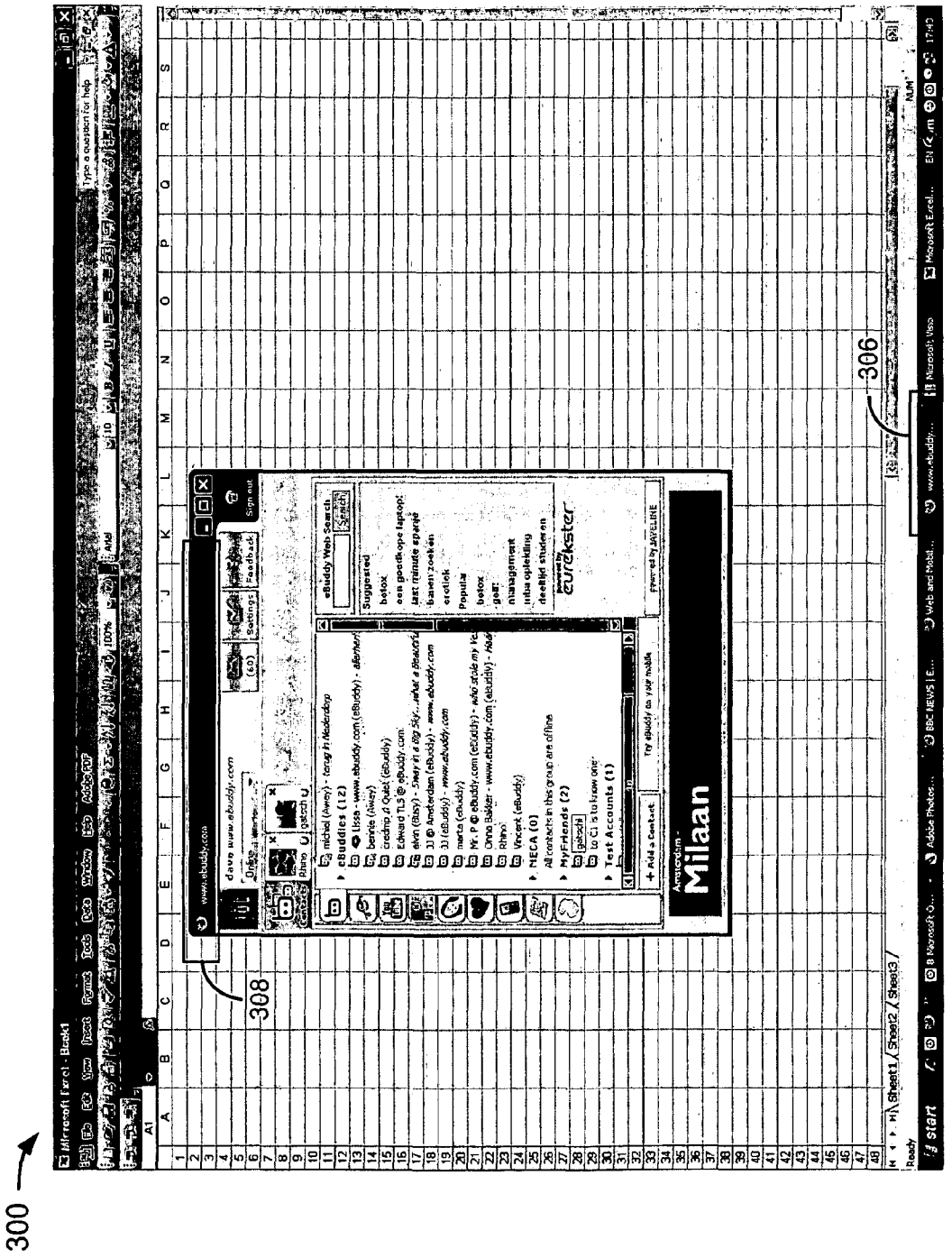

FIG. 3C

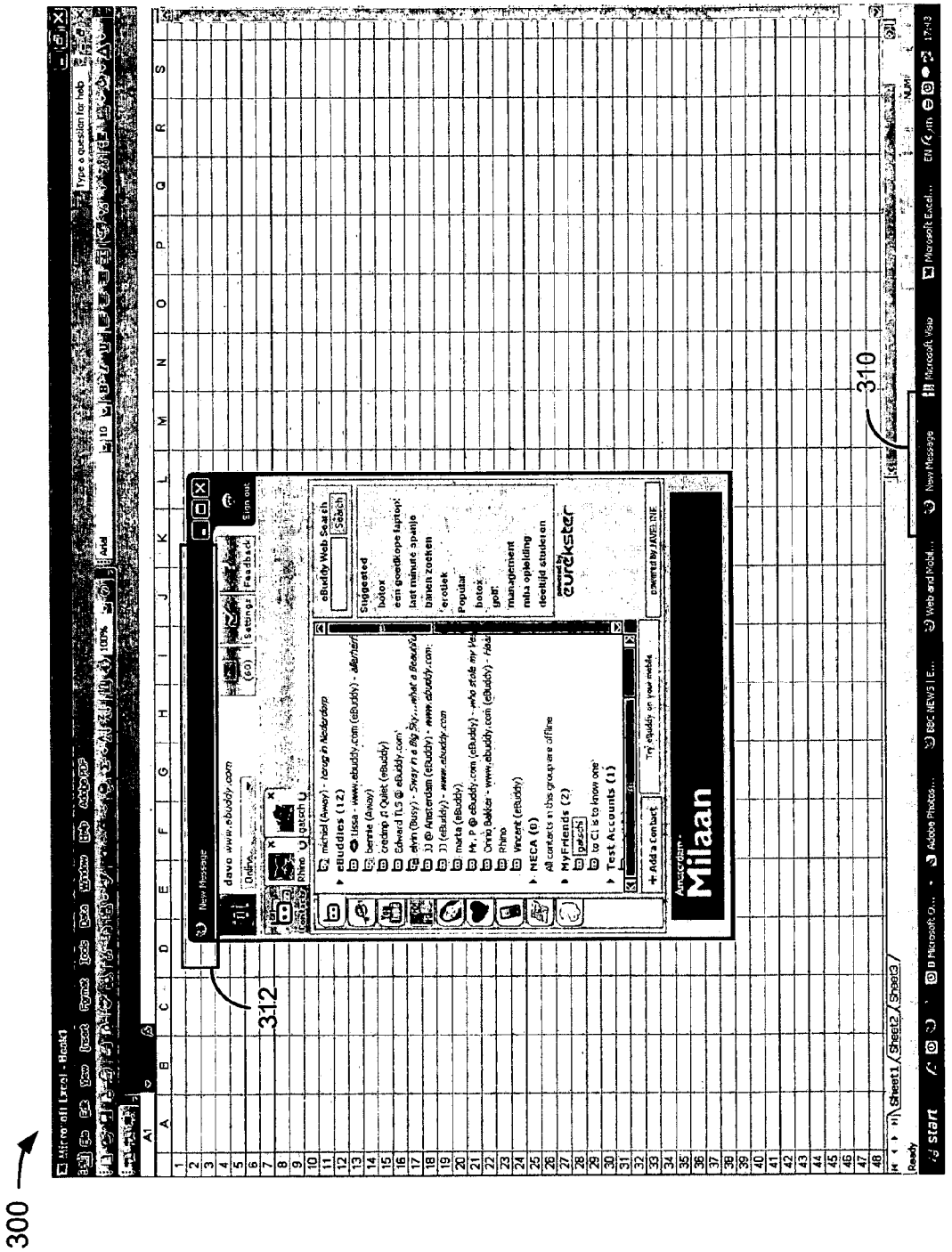

FIG. 3D

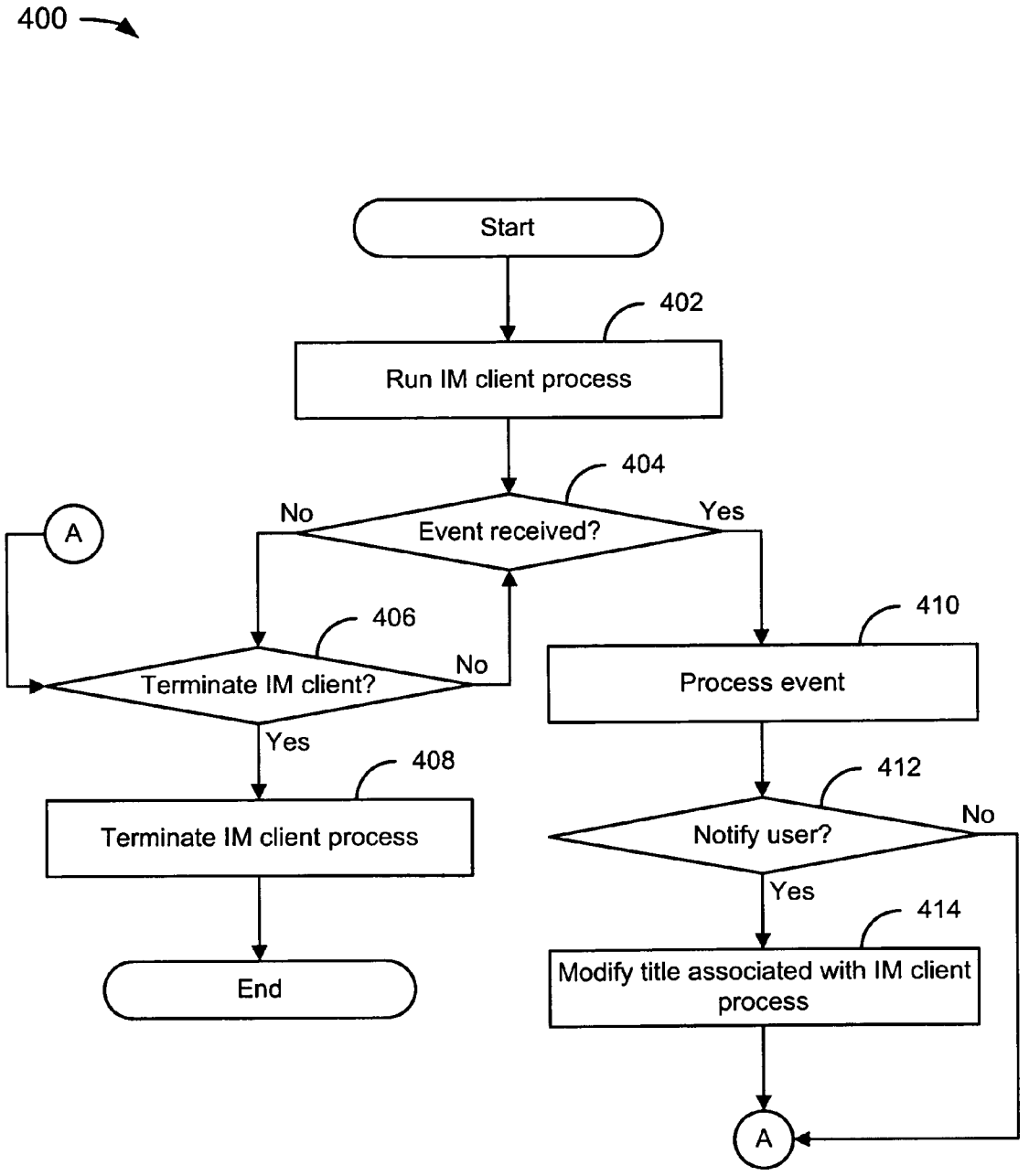
400
Start
402
Run IM client process
404
Event received?
No
Yes
A
406
Terminate IM client?
No
Yes
408
Terminate IM client process
End
410
Process event
412
Notify user?
No
Yes
414
Modify title associated with IM client process
A

FIG. 4

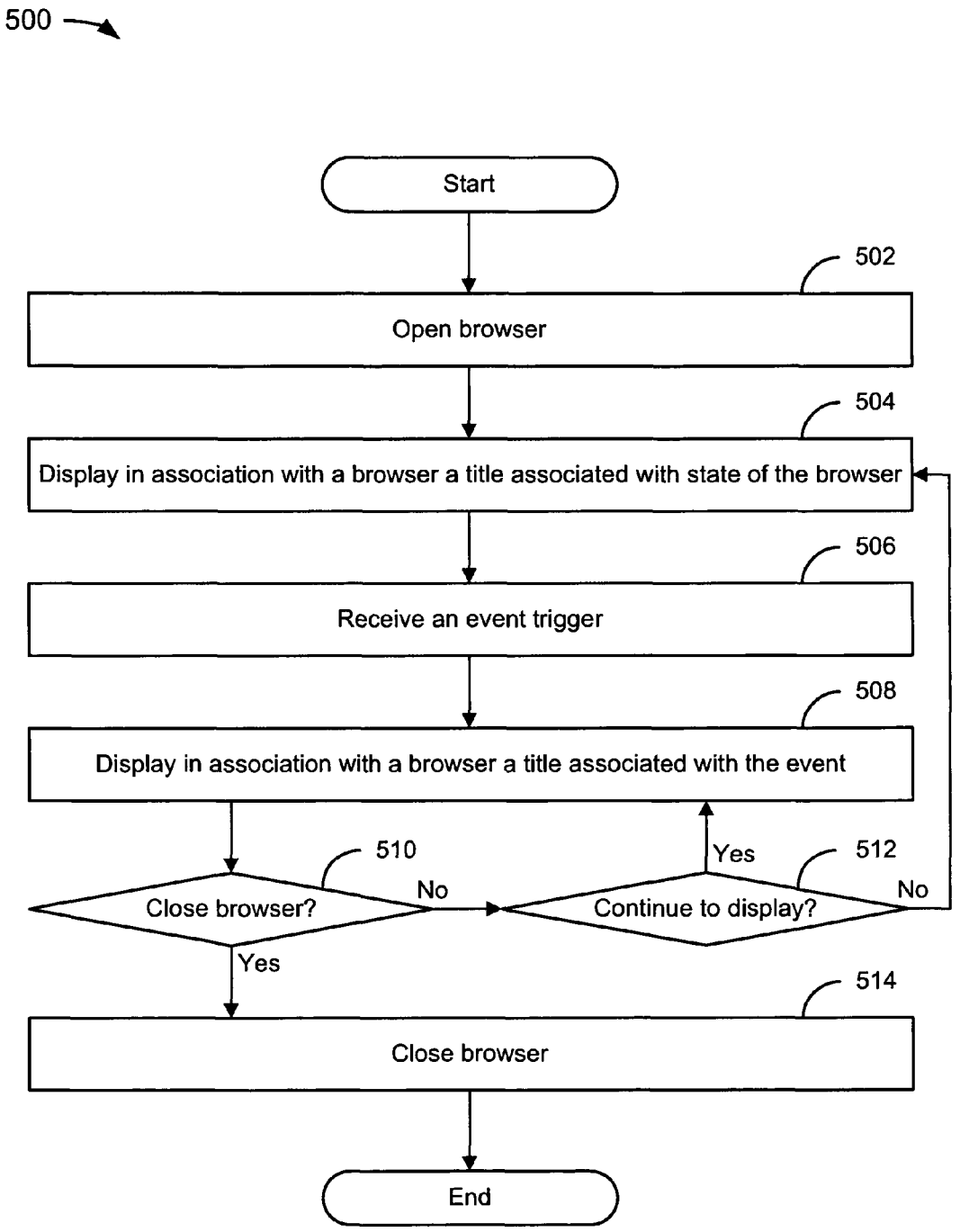
500
Start
502
Open browser
504
Display in association with a browser a title associated with state of the browser
506
Receive an event trigger
508
Display in association with a browser a title associated with the event
510
Close browser?
No
Yes
512
Continue to display?
Yes
No
514
Close browser
End

FIG. 5

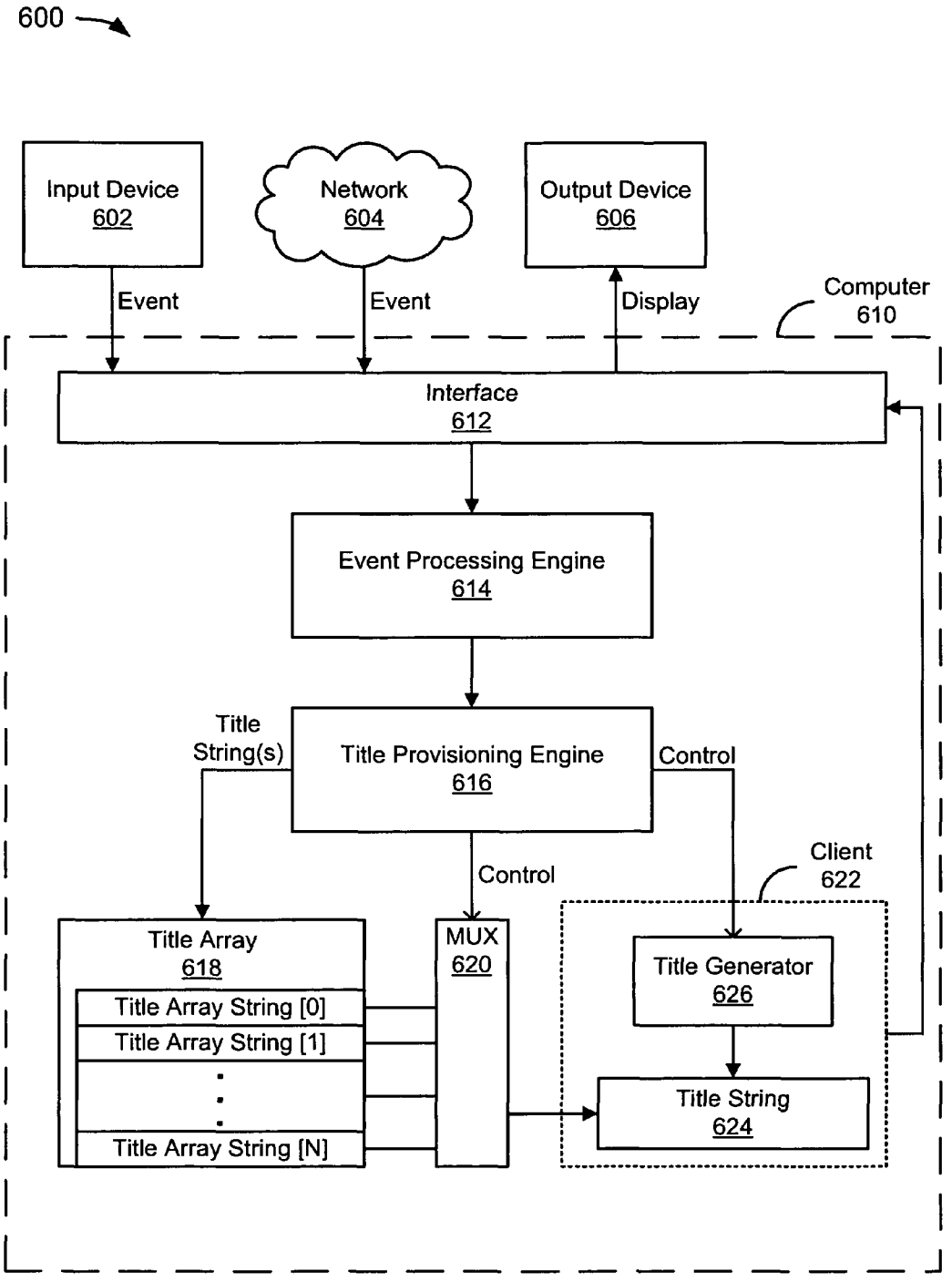
600
Input Device
602
Network
604
Output Device
606
Event
Event
Display
Computer
610
Interface
612
Event Processing Engine
614
Title
String(s)
Title Provisioning Engine
616
Control
Control
Client
622
Title Array
618
Title Array String [0]
Title Array String [1]
Title Array String [N]
MUX
620
Title Generator
626
Title String
624

FIG. 6

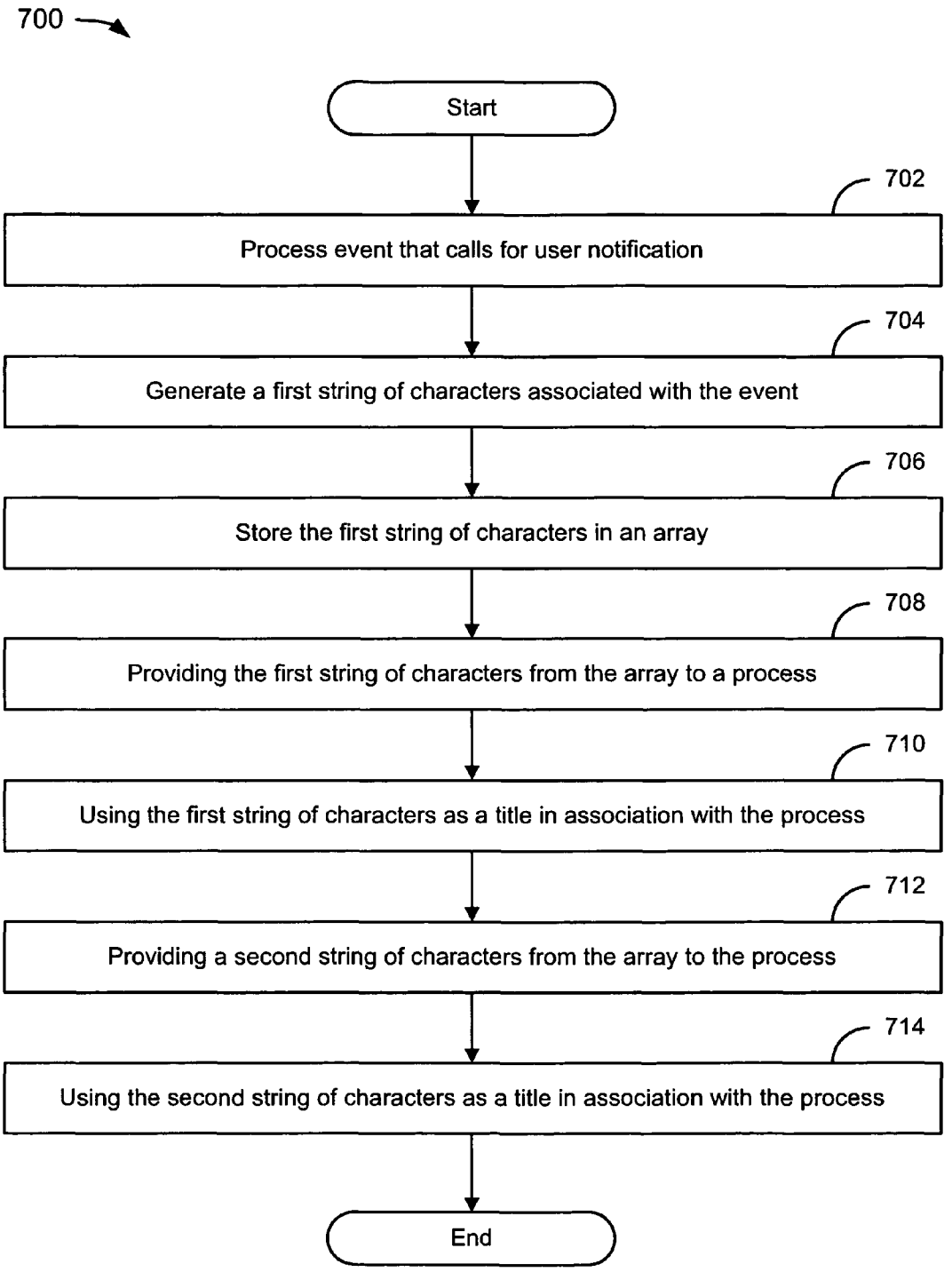
700
Start
702
Process event that calls for user notification
704
Generate a first string of characters associated with the event
706
Store the first string of characters in an array
708
Providing the first string of characters from the array to a process
710
Using the first string of characters as a title in association with the process
712
Providing a second string of characters from the array to the process
714
Using the second string of characters as a title in association with the process
End

FIG. 7

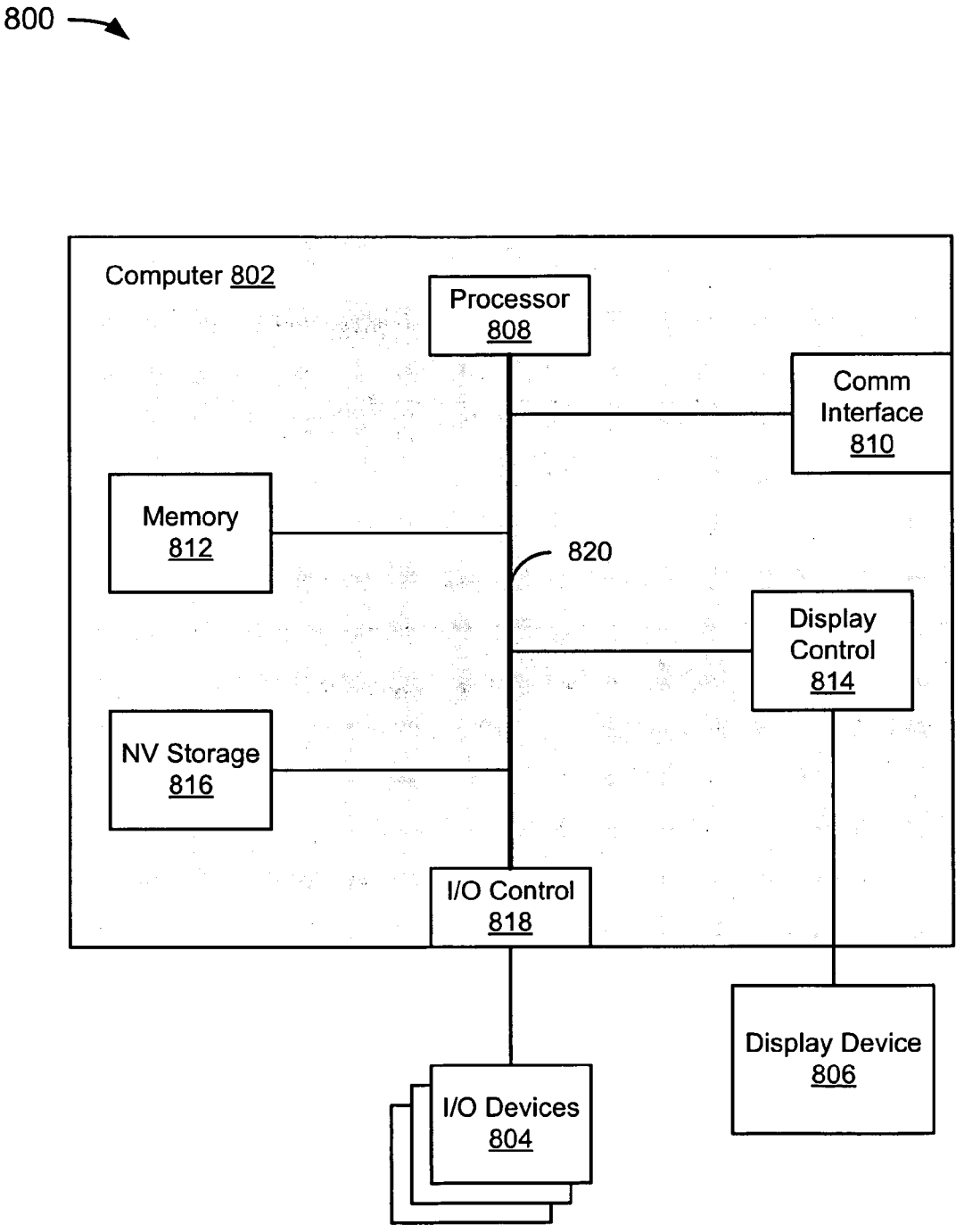
800
Computer 802
Processor 808
Comm Interface 810
Memory 812
820
Display Control 814
NV Storage 816
I/O Control 818
Display Device 806
I/O Devices 804

FIG. 8

EVENT NOTIFICATION SYSTEM AND METHOD

CROSS-REFERENCE TO RELATED APPLICATIONS

This Patent Application claims priority to U.S. Provisional Patent App. No. 60/748,988, filed Dec. 9, 2005, which is incorporated herein by reference. This Patent Application is related to U.S. patent application Ser. Nos. 11/637,954, 11/637,268, 11/637,964, 11/637,316, to Taylor, et al., respectively entitled HIGH LEVEL NETWORK LAYER SYSTEM AND METHOD, PICTURE PROVISIONING SYSTEM AND METHOD, MESSAGE HISTORY DISPLAY SYSTEM AND METHOD, and CONTACT LIST DISPLAY SYSTEM AND METHOD, filed concurrently herewith and incorporated by reference herein.

BACKGROUND

Instant messaging requires the use of a client program that hooks up an instant messaging service and differs from e-mail in that conversations are then able to happen in real time. Most services offer a presence information feature, indicating whether people on one's list of contacts are currently online and available to chat. This may be called a contact list. In early instant messaging programs, each letter appeared as it was typed, and when letters were deleted to correct typos this was also seen in real time. This made it more like a telephone conversation than exchanging letters. In modern instant messaging programs, the other party in the conversation generally only sees each line of text right after a new line is started. Most instant messaging applications also include the ability to set a status message, roughly analogous to the message on a telephone answering machine.

Popular instant messaging services on the public Internet include .NET Messenger Service, MSN Messenger, AOL Instant Messenger, Excite/Pal, Gadu-Gadu, Google Talk, iChat, ICQ, Jabber, Qnext, QQ, Meetro, Skype, Trillian and Yahoo! Messenger. These services owe many ideas to an older (and still popular) online chat medium known as Internet Relay Chat (IRC).

The foregoing examples of the related art and limitations related therewith are intended to be illustrative and not exclusive. Other limitations of the related art will become apparent to those of skill in the art upon a reading of the specification and a study of the drawings.

SUMMARY

The following embodiments and aspects thereof are described and illustrated in conjunction with systems, tools, and methods that are meant to be exemplary and illustrative, not limiting in scope. In various embodiments, one or more of the above-described problems have been reduced or eliminated, while other embodiments are directed to other improvements.

A technique for user notification involves modifying a title associated with a process to include information about an event that calls for user notification. A method according to the technique may include running a process, such as, by way of example but not limitation, an IM client process, a browser, or some other process that has a title associated therewith. The method may further include processing an event, such as by way of example but not limitation, a new mail event, a new instant message event, a reminder event, a calendar event, or some other event, and generating a string of characters that includes information associated with the event. The method may further include displaying the string of characters as a title associated with the process. A system constructed according to the technique may include a client, a title array, an event processing engine, and a title provisioning engine.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the inventions are illustrated in the figures. However, the embodiments and figures are illustrative rather than limiting; they provide examples of the invention.

FIG. **1** depicts an example of a system for providing instant messages to clients via a web interface.

FIG. **2** depicts an example of a system for displaying content from an IM client at an alternative IM client.

FIGS. **3**A-**3**D depict examples of screenshots with IM notification functionality.

FIG. **4** depicts a flowchart of an example of a method for changing a title associated with a titlebar.

FIG. **5** depicts a flowchart of an example of a method for displaying an event-related title.

FIG. **6** depicts an example of a system for programmed text event-specific title provisioning.

FIG. **7** depicts a flowchart of an example of a method for displaying programmed text files.

FIG. **8** depicts a computer system suitable for implementation of the techniques described above with reference to FIGS. **1**-**7**.

DETAILED DESCRIPTION

In the following description, several specific details are presented to provide a thorough understanding of embodiments of the invention. One skilled in the relevant art will recognize, however, that the invention can be practiced without one or more of the specific details, or in combination with other components, etc. In other instances, well-known implementations or operations are not shown or described in detail to avoid obscuring aspects of various embodiments, of the invention.

FIG. **1** depicts an example of a system **100** for providing instant messages to clients via a web interface. In the example of FIG. **1**, the system **100** includes a network **102**, a server **104**, and an Instant Messenger (IM) server **106**, and an IM network **108**. The server **104** is coupled to the network at least by way of port **80**. The two way communication via port **80** is represented in the example of FIG. **1** as an arrow **110**. The server **104** is coupled to the IM server **106** via one or more other ports. The two way communication via the other ports is represented in the example of FIG. **1** as an arrow **112**. The IM server **106** is coupled to the IM network **108** via any known or convenient mechanism. Indeed, the IM server **106** may be thought of as part of the IM network **108**. The network **102** couples a plurality of clients **114-1** to **114**-N (referred to collectively as clients **114**) to the server **104**. In the example of FIG. **1**, the server **104** includes an event queue **116**.

The network **102** may include by way of example but not limitation LAN, WAN, VLAN, WLAN, Internet, cellular network, phone network, radio network, or some other known or convenient network. The term "Internet" as used herein refers to a network of networks that uses certain protocols, such as TCP/IP, and possibly other protocols such as the hypertext transfer protocol (HTTP) for hypertext markup language (HTML) documents that make up the World Wide Web (the web). The physical connections of the Internet and the pro-

tocols and communication procedures are well known, but any convenient physical connections or protocols could be used.

The server **104** may include a multiple servers. Indeed, it may be desirable, depending upon details of a particular implementation, to install several servers to cope with the number of simultaneous users the system **100** supports. It may further be desirable, depending upon details of a particular implementation, for the server **104** to have a high CPU throughput, together with large amounts of RAM, to handle a large number of users. It may further be desirable, depending upon details of a particular implementation, to accomplish resource sharing via thread handling where a pool of threads is shared and used by one or more of the clients **114** for client-server communication and between the server **104** and the IM server **106**.

The server **104** may include one or more of an application server, database server, web server, banners server, and content server, or any combination thereof. To make the most of the techniques described herein, the server **104** should, though is not required to, include at least one application server. The other servers can have supporting roles in, by way of example but not limitation, serving static content or advertising (e.g., banners), storing usage data, or fulfilling some other known or convenient function.

The server **104** may act as a proxy server between the clients **114** and the IM server **106**. The server **104** receives communications from the clients **114** on http port **80**, and responds to the clients **114** on http port **80**. Communications from the clients **114** that are bound for the IM network **108**, however, must also come through http port **80** to the server **104**, and are then forwarded to the IM server **106**. In this way, the server **104** acts as a carrier of the data from users to the IM network **108** using a mechanism that controls and manages the data (e.g., text messages, display images, emotions, audio/video streams, etc.) sent between one of the clients **114** and the server **104**, and vice versa.

The IM server **106** may be any known or convenient IM server that is compatible with IM. Events, messages, or other appropriate data from the IM server **106** are collected in the event queue **116** of the server **104**. The events may be collected in association with a variety of protocols including by way of example but not limitation port **1863**, port **5050**, port **5222**, port **5190**, etc.

The IM network **108** may include one or a combination of networks selected from MSN Messenger, Yahoo! Messenger, AIM AOL, ICQ, QQ, Jabber, Google Talk, IRC, or some other known or convenient IM network.

The clients **114** may include any known or convenient device, including by way of example but not limitation, a Web browser, mobile client, PDA, game console, TV box, native application, etc. The clients poll the server **104** for events. The events can be removed from the event queue **116** and translated into text, JavaScript, XML, or some other known or convenient format that one or more of the clients **114** need or expect in order to process data associated with the event.

To interact with the IM network **108**, the clients **114** send data to the server **104**. The data, which may include commands, is processed and translated into corresponding data that will be sent to the appropriate IM network. In an embodiment, the appropriate IM network may be determinable based upon the protocol encoded in a message.

Messages or actions from the clients **114** are collected over network protocols such as, by way of example but not limitation, HTTP or plain socket connections. The messages or actions are transformed to an appropriate protocol format to be sent over a compliant port from the clients **114** to the server **104**, with the IM protocol on the application side. In a non-limiting embodiment, the compliant port is http port **80**. However, any port having similar characteristics to those of a typical port **80** could be used.

The latest available browsers, as of December 2005, enable the use of a technique called AJAX (Asynchronous JavaScript And XML). With AJAX, appropriately configured clients **114** can execute actions and poll for messages or events using only JavaScript. The method is based on using an XMLHttpRequest object to make HTTP requests to the server **104**. The server **104** may reply with messages taken from the queue of the corresponding session in XML (or another) format that are parsed and displayed according to the message content.

For clients **114** that include a browser, when accessing the server **104** the browser typically uses hidden HTML frames to update information on visible frames. The visible frames display appropriate information while the hidden frames are reloaded in short periods of time. In each refresh that hits the server **104**, the browser identifies the current messaging session and checks if new events or messages associated with the session are in the event queue **116**. When new information arrives and needs to be displayed in some form, the browser makes use of, for example, JavaScript code to update the visible frames and windows with new messages or events keeping the information up to date in the screen. In this way, automatic refreshing can take place in a hidden frame.

In another embodiment, certain of the clients **114** with browsers may not make use of refreshes. For example, a form of updating the screen without using a refresh technique is to keep one single HTTP socket request alive for the whole period of a messaging session without actually closing the socket connection. In this example, information is initially loaded and displayed in one single visible frame. While events and messages are being received by the server **104**, JavaScript code can be injected into the HTML document through the same HTTP socket kept alive and managed by the server **104**. For each event or message, the browser can interpret the JavaScript code injected and the corresponding parts of the HTML document and windows will be updated.

In another embodiment, certain of the clients **114** with browsers may make use of manual refreshes. Some relatively unsophisticated browsers, such as WAP and XHTML browsers often available on mobile phones, do not support hidden frames and/or JavaScript (and others may be configured such that they do not support hidden frames and/or JavaScript). In such cases, the information displayed has to be updated manually by the user. Manual updating enables any mobile phone, PDA, TV Set or any device with a browser to connect to the server **104** and use the messaging platforms made available by the server **104** assuring the communication between the clients **114** and the IM server **106**.

Message history can be stored by most IM clients on a local computer. For alternative web and mobile-based clients local storage may not be possible. In a non-limiting embodiment, the server **104**, may have the capability to store message history from IM conversations done via one or more of the clients **114**. The message history can be accessed and searched at any time via the server **104** by one or more of the clients **114**

FIG. **2** depicts an example of a system **200** for displaying content from an IM client at an alternative IM client. In the example of FIG. **2**, the system **200** includes a client **202**, an IM network **204**, a server **206**, an IM network **208**, a client **210**, other IM networks **212-1** to **212**-N (referred to collectively as other IM networks **212**), and other clients **214-1** to **214**-N (referred to collectively as other clients **214**).

For illustrative purposes, it is assumed that the client **202** has content that is compatible with the IM network **204**. However, the client **210** is capable of reading content formatted to be compatible with the IM network **208**. Thus, in operation, the server **206** collects content from the client **202** (either through the IM network **204**, as shown in FIG. **2**, or directly from the client **202**, such as is shown by way of example in FIG. **1**). The server **206** then formats the content as appropriate for use on the IM network **208**. Once the content is properly formatted, it can be made available to the client **210** (either through the IM network **208**, as shown in FIG. **2**, or directly to the client **210**, such as is shown by way of example in FIG. **1**). Depending upon the embodiment and/or implementation, the content may also be formatted as appropriate for one or more of the other IM networks **212**, to be made available for one or more of the other clients **214**.

As is well-understood, different devices provide different functionality. For example, a desktop typically provides greater storage, greater display area, and greater power than a cell phone. Thus, at best, an IM client must work under the constraints imposed by a particular device. Depending upon the device, certain functionality may be more useful. For example, a device may have inferior capabilities with respect to notifying a user when a message is received.

The device capabilities may limit the way in which a user can be notified when a message is received. The environment in which a user operates may provide another limitation. For example, a user at work may not want to play a noise or have a popup window show up every time a message is received. Similarly, a user who gets lots of messages may not want to hear the noise or see the popup windows because of the great frequency with which it occurs. Advantageously, notification can take place in a titlebar, which is great for devices that have inferior notification functionality, and great for users who want a subtle notification.

FIGS. **3**A-**3**D depict examples of screenshots **300** with IM notification functionality. The bar may be a titlebar, a taskbar, or some other menu or display item. In the example of FIG. **3**A, the taskbar includes a process identified by the taskbar item **302**. For illustrative purposes, the process is a Firefox® web browser that is at the site www.ebuddy.com. The screenshot appears as a conventional screen might look. However, when a new message arrives, the taskbar changes.

In the example of FIG. **3**B, the taskbar includes the Firefox® web browser process, but the taskbar item **304** appears differently. Specifically, rather than depicting the site www.ebuddy.com, the taskbar item **304** now indicates that a new message is available. The IM notification functionality may be cool on a desktop, but can be particularly useful in other implementations.

For example, notifying a user when new messages arrive or events happen can gracefully be done by a native IM application. However, for alternative web clients this is more difficult given the nature of control from within a browser to the Operating System. There is less control for alerts like flashing windows etc. from browsers. In such cases, it may be particularly advantageous for a server to be able to provide a user with alerts for new messages or events using the title bar, task bar, or other display area of a browser.

In the example of FIG. **3**C, the Firefox® browser is open, and the taskbar item **306** indicates the current site is www.ebuddv.com. The titlebar **308** includes similar information. If a new message is received, then both the titlebar and the taskbar can be changed.

In the example of FIG. **3**D, the taskbar includes the Firefox® web browser with a changed taskbar item **310**. The titlebar **312** is also changed to indicate a new message has been received. The exact information in a titlebar, taskbar, or other display area is implementation specific. Thus, the titlebar **312** is simply illustrative. When an event, message, or other data is available to the client, the titlebar **312** may change to show information about the event. If properly configured, the taskbar item **310** and the titlebar **312** could even display different information (though in a typical implementation the text is identical, albeit often necessarily shortened on the taskbar).

The title can be used to notify users of certain events by changing the title of the IM client. The changing of the text in the taskbar and/or titlebar may stand out from other taskbars and/or with fixed texts.

FIG. **4** depicts a flowchart **400** of an example of a method for changing a title associated with a titlebar (and an associated taskbar item, if applicable). In the example of FIG. **4**, the flowchart **400** starts at module **402** where an IM client process is running. The IM client process may include, by way of example but not limitation, a browser.

In the example of FIG. **4**, the flowchart **400** continues to decision point **404** where it is determined whether an event has been received. If it is determined that an event has not been received (**404**-N), then the flowchart **400** continues to decision point **406** where it is determined whether to terminate the IM client process. If it is determined that the IM client process is to be terminated (**406**-Y), then the flowchart **400** continues to module **408** where the IM client process is terminated, and the flowchart **400** ends. If, on the other hand, it is determined that the IM client process is not to be terminated (**406**-N) then the flowchart **400** loops back to decision point **404**, as described above.

In the example of FIG. **4**, eventually, assuming the IM client process is not terminated (**408**), it is determined that an event has been received (**404**-Y), and the flowchart **400** continues to module **410** where the event is processed. Events are processed in a known or convenient manner.

In the example of FIG. **4**, the flowchart **400** continues to decision point **412** where it is determined whether notification is called for. Events may or may not result in notification of a user, depending upon the event, embodiment, implementation, device limitations, and/or user's IM client configuration. If it is determined that user notification is called for (**412**-Y), then the flowchart **400** continues to module **414** where a title associated with the IM client process is modified. If, on the other hand, it is determined that user notification is not called for (**412**-N), or in any case after module **414**, the flowchart **400** loops back to decision point **406**, as described above.

Modifying the title (**414**) presumably modifies the display in the applicable titlebar and/or the display in the applicable taskbar item. Conventional browsers typically do not allow setting a title in a titlebar that is different from the corresponding taskbar item. However, a display area could display information different from that of the title, if configured appropriately. Moreover, future browsers may include functionality that allows displaying different titles in the titlebar and the taskbar.

The title of the application may or may not keep the changed value until the user takes some action (e.g., clicking on the taskbar item associated with the IM client process). For example, the original title could be displayed after a certain amount of time has passed (e.g., a "new message" title could last for 10 seconds before reverting to the original title). FIG. **5** depicts a flowchart **500** of an example of a method for displaying an event-related title. In the example of FIG. **5**, the flowchart **500** starts at module **502** where a browser is opened.

In the example of FIG. **5**, the flowchart **500** continues to module **504** a title associated with state of a browser is displayed in association with the browser. The state of the browser may include, for example, a current site for which the browser is displaying a page, as is shown in FIGS. **3**A and **3**C. In general, the title associated with state of the browser includes any title that would normally be displayed in association therewith prior to updating the title in response to an event notification.

In the example of FIG. **5**, the flowchart **500** continues to module **506** where an event trigger is received. The event trigger is associated with an event that calls for notifying a user. For example, the event trigger may include receipt of a new instant message.

In the example of FIG. **5**, the flowchart **500** continues to module **508** where a title associated with the event is displayed in association with the browser. Thus, the title associated with the state of the browser is replaced by the title associated with the event. Moreover, in a non-limiting embodiment, the state of the browser is unchanged (other than the title, of course).

In the example of FIG. **5**, the flowchart **500** continues to decision point **510** where it is determined whether to close the browser. If the browser is not to be closed (**510**-N), then the flowchart **500** continues to decision point **512** where it is determined whether to continue to display the title associated with the event. If so (**512**-Y), then the flowchart **500** loops back to module **508**, as described previously. If not (**512**-N), then the flowchart **500** loops back to module **504**, as described previously. The determination as to whether to continue to display the title associated with the event may be based upon, by way of example but not limitation, a notification timer, an event-specific timer, a user action, or some other action that is sufficient to indicate that the title associated with the event should not longer be displayed. If, on the other hand, the browser is to be closed (**510**-Y), then the flowchart **500** continues to module **514** where the browser is closed, and the flowchart **500** ends.

The title of, e.g., a window shows up in both the titlebar of a window and in the taskbar. Advantageously, users can be notified of events in the taskbar, while they are using another application. The changing taskbar would benefit clients on devices using a desktop system that allows multiple applications to run at the same time, e.g. Mail client, Browser, IM, etc. While users are switching between various applications and an IM client they may not be aware of new messages/events that have arrived. The alternating messages can be seen in a taskbar even if, for example, the browser window is minimized or behind other application or browser windows (as in FIGS. **3**A, **3**B).

Advantageously, in an embodiment, a title associated with an event can include programmed text effects. FIG. **6** depicts an example of a system **600** for programmed text event-specific title provisioning. The system **600** includes an input device **602**, a network **604**, an output device **606**, and a computer **610**. The input device **602** may be any known or convenient device that is capable of generating or forwarding events to the computer **610**. In a typical implementation, events will be received at the computer **610** via the network **604**. Most computers include output devices for on which a variety of output is displayed.

The computer **610** includes an interface **612**, an event processing engine **614**, a title provisioning engine **616**, a title array **618**, a multiplexer **620**, and a client **622**. The interface **612** may include an implementation-specific number of different kinds of known or convenient interfaces. The input device **602**, the network **604**, and the output device **606** are coupled to the computer **610** using the interface **612**.

An event received on the interface **612** (from either the input device **602** or the network **604**) is provided to the event processing engine **614** for processing in a known or convenient manner. The event processing engine **614** may be embodied in a computer-readable medium. If user notification is desired for the event, the user can be notified in any known or convenient manner.

Advantageously, data associated with the event can also (or in the alternative) be provided to the title provisioning engine **616**. The title provisioning engine **616** may be embodied in a computer-readable medium. In the example of FIG. **6**, the title provisioning engine **616** inputs title strings, which are strings of characters, to the title array **618**. The title array **618** includes N-**1** title array strings, embodied in a computer-readable medium, which are referenced (for illustrative purposes) as title array string [**0**] to title array string [N].

A given event may cause the title provisioning engine **616** to rewrite the entire title array **618** with title strings associated with the most recent events. Alternatively, a given event may cause the title provisioning engine **616** to append title strings to the end of the title array **618**. In a non-limiting embodiment, the title provisioning engine **616** updates the current title array **618** by adding new data associated with an event, excluding redundant data (e.g., data that is already represented in the title array **618**).

In the example of FIG. **6**, the multiplexer **620** selects one of the title array strings for provisioning to the client **622**. The multiplexer **620** receives a control signal from the title provisioning engine **616** to accomplish this task. The multiplexer **620** is a conceptual construct that is intended to illustrate selecting one of the title array strings using an index to the title array **618**. Thus, the multiplexer **620** may or may not be embodied in a computer-readable medium. It should be noted that the multiplexer **620**, in at least one embodiment, is not a hardware MUX, though it could conceivably be implemented as such.

In the example of FIG. **6**, the client **622** includes a title string **624** and a title generator **626**. The client **622** may include, by way of example but not limitation, an IM client, an email client, a VoIP client, or some other communications-related client. The client **622** may include a window, panel, or some other display that includes a title. The title generator **626** generates a title for the display in a known or convenient manner.

However, in a non-limiting embodiment, the title provisioning engine **616** controls the title generator **626** to either generate a title in the usual way (e.g., using the state of the client **622** to determine an appropriate title), or to not generate a title because a title string is available from the title array **618**. Thus, title string **624**, which is embodied in a computer-readable medium in association with the display, will include either a title generated in accordance with the state of the client **622** or a title string from the title array **618** (specifically, the title array string selected by the multiplexer **620**). The display (e.g., a window including the title string **624**) is provided to the interface **612** for display on the output device **606**.

Advantageously, although the title string **624** is likely to have display limitations associated with the client **622**, the operating system, the output device **606**, or other factors, creative control of the title array **618** can yield interesting title display characteristics. For example, the title can appear to have scrolling text, blinking, alternating upper and lower case, etc.

Scrolling text may be accomplished by cycling through the title array **618** over time. After the title array string [N] is displayed, the title array **618** can start over at title array string [**0**], or allow the title generator **626** to generate a title instead. The scrolling text could include the actual message of an IM message, displayed in the title over time, the scrolling text could scroll through a list of senders of email that has not yet been checked. Blinking can be accomplished by, conceptually, making every other title array string blank. Alternatively, a NULL string could be periodically provided instead of a title array string. The number of programmed text effects available to those of ordinary skill in the art of computer programming, with this teaching before them, are practically impossible to list exhaustively so no effort is made to do so herein.

FIG. **7** depicts a flowchart **700** of an example of a method for displaying programmed text titles. In the example of FIG. **7**, the flowchart **700** starts at module **702** where an event that calls for user notification is processed. It may be noted that whether the event calls for user notification may or may not be known until after the event is processed.

In the example of FIG. **7**, the flowchart **700** continues to module **704** where a first string of characters associated with the event is generated. There may or may not be a second, third, etc. string of characters associated with the event generated, as well.

In the example of FIG. **7**, the flowchart **700** continues to module **706** where the first string of characters is stored in an array. The array may include other strings of characters associated with other events, or the first string of characters (and second, third, etc. string of characters) associated with the event may replace all current characters strings of the array.

In the example of FIG. **7**, the flowchart **700** continues to module **708** where the first string of characters is provided from the array to a process. The process may include, by way of example but not limitation, an IM client operating in a Windows® environment.

In the example of FIG. **7**, the flowchart **700** continues to module **710** where the first string of characters is used as a title in association with the process. For example, if the process is an IM client operating in a Windows® environment, the first string of characters could be used such that the window associated with the IM client includes the first string of characters (or at least the first subset of the first string of characters, if the window is too small to display the entire string) in the titlebar. Similarly, in this specific example, the first string of characters could be displayed in a taskbar item associated with the IM client.

In the example of FIG. **7**, the flowchart **700** continues to module **712** where a second string of characters is provided from the array to the process. The second string of characters could be associated with the same event as the first string of characters, an earlier event (where the second string remains in the array), or a later event (where the second string replaces or is in addition to strings associated with the last processed event). The second string of characters could also be unassociated with an event. For example, the second string of characters could be a NULL string that has the effect of causing the first string of characters (if provided before and after the second string of characters) to blink or flash.

In the example of FIG. **7**, the flowchart **700** continues to module **714** where the second string of characters is used as a title in association with the process. Then the flowchart **700** ends. It should be noted that the flowchart **700** simply illustrates a first and second string of characters from the array being used as a title, and then ends. Of course, the flowchart could continue with modules (not shown) where the first string of characters is repeated as a title, another event is processed, a third string of characters is provided, or with some other applicable module or sequence of modules.

FIG. **8** depicts a computer system **800** suitable for implementation of the techniques described above with reference to FIGS. **1-7**. The computer system **800** includes a computer **802**, I/O devices **804**, and a display device **806**. The computer **802** includes a processor **808**, a communications interface **810**, memory **812**, display controller **814**, non-volatile storage **816**, and I/O controller **818**. The computer **802** may be coupled to or include the I/O devices **804** and display device **806**.

The computer **802** interfaces to external systems through the communications interface **810**, which may include a modem or network interface. The communications interface **810** can be considered to be part of the computer system **800** or a part of the computer **802**. The communications interface **810** can be an analog modem, ISDN modem, cable modem, token ring interface, satellite transmission interface (e.g. "direct PC"), or other interfaces for coupling a computer system to other computer systems. Although conventional computers typically include a communications interface of some type, it is possible to create a computer that does not include one, thereby making the communications interface **810** optional in the strictest sense of the word.

The processor **808** may include, by way of example but not limitation, a conventional microprocessor such as an Intel Pentium microprocessor or Motorola power PC microprocessor. While the processor **808** is a critical component of all conventional computers, any applicable known or convenient processor could be used for the purposes of implementing the techniques described herein. The memory **812** is coupled to the processor **808** by a bus **820**. The memory **812**, which may be referred to as "primary memory," can include Dynamic Random Access Memory (DRAM) and can also include Static RAM (SRAM). The bus **820** couples the processor **808** to the memory **812**, and also to the non-volatile storage **816**, to the display controller **814**, and to the I/O controller **818**.

The I/O devices **804** can include a keyboard, disk drives, printers, a scanner, and other input and output devices, including a mouse or other pointing device. For illustrative purposes, at least one of the I/O devices is assumed to be a block-based media device, such as a DVD player. The display controller **814** may control, in a known or convenient manner, a display on the display device **806**, which can be, for example, a cathode ray tube (CRT) or liquid crystal display (LCD).

The display controller **814** and I/O controller **818** may include device drivers. A device driver is a specific type of computer software developed to allow interaction with hardware devices. Typically this constitutes an interface for communicating with the device, through a bus or communications subsystem that the hardware is connected to, providing commands to and/or receiving data from the device, and on the other end, the requisite interfaces to the OS and software applications.

The device driver may include a hardware-dependent computer program that is also OS-specific. The computer program enables another program, typically an OS or applications software package or computer program running under the OS kernel, to interact transparently with a hardware device, and usually provides the requisite interrupt handling necessary for any necessary asynchronous time-dependent hardware interfacing needs.

The non-volatile storage **816**, which may be referred to as "secondary memory," is often a magnetic hard disk, an optical disk, or another form of storage for large amounts of data.

Some of this data is often written, by a direct memory access process, into memory **812** during execution of software in the computer **802**. The non-volatile storage **816** may include a block-based media device. The terms "machine-readable medium" or "computer-readable medium" include any known or convenient storage device that is accessible by the processor **808** and also encompasses a carrier wave that encodes a data signal.

The computer system **800** is one example of many possible computer systems which have different architectures. For example, personal computers based on an Intel microprocessor often have multiple buses, one of which can be an I/O bus for the peripherals and one that directly connects the processor **808** and the memory **812** (often referred to as a memory bus). The buses are connected together through bridge components that perform any necessary translation due to differing bus protocols.

Network computers are another type of computer system that can be used in conjunction with the teachings provided herein. Network computers do not usually include a hard disk or other mass storage, and the executable programs are loaded from a network connection into the memory **812** for execution by the processor **808**. A Web TV system, which is known in the art, is also considered to be a computer system, but it may lack some of the features shown in FIG. **8**, such as certain input or output devices. A typical computer system will usually include at least a processor, memory, and a bus coupling the memory to the processor.

The computer system **800** may be controlled by an operating system (OS). An OS is a software program—used on most, but not all, computer systems—that manages the hardware and software resources of a computer. Typically, the OS performs basic tasks such as controlling and allocating memory, prioritizing system requests, controlling input and output devices, facilitating networking, and managing files. Examples of operating systems for personal computers include Microsoft Windows®, Linux, and Mac OS®. Delineating between the OS and application software is sometimes rather difficult. Fortunately, delineation is not necessary to understand the techniques described herein, since any reasonable delineation should suffice.

As used herein, algorithmic descriptions and symbolic representations of operations on data bits within a computer memory are believed to most effectively convey the techniques to others skilled in the art. An algorithm is here, and generally, conceived to be a self-consistent sequence of operations leading to a desired result. The operations are those requiring physical manipulations of physical quantities. Usually, though not necessarily, these quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated. It has proven convenient at times, principally for reasons of common usage, to refer to these signals as bits, values, elements, symbols, characters, terms, numbers, or the like.

It should be borne in mind, however, that all of these and similar terms are to be associated with the appropriate physical quantities and are merely convenient labels applied to these quantities. Unless specifically stated otherwise as apparent from the following discussion, it is appreciated that throughout the description, discussions utilizing terms such as "processing" or "computing" or "calculating" or "determining" or "displaying" or the like, refer to the action and processes of a computer that manipulates and transforms data represented as physical (electronic) quantities within the computer system's registers and memories into other data similarly represented as physical quantities within the computer system memories or registers or other such information storage, transmission or display devices.

An apparatus for performing techniques described herein may be specially constructed for the required purposes, or it may comprise a general purpose computer selectively activated or reconfigured by a computer program stored in the computer. Such a computer program may be stored in a computer readable storage medium, such as, by way of example but not limitation, read-only memories (ROMs), RAMs, EPROMs, EEPROMs, magnetic or optical cards, any type of disk including floppy disks, optical disks, CD-ROMs, DVDs, and magnetic-optical disks, or any known or convenient type of media suitable for storing electronic instructions.

The algorithms and displays presented herein are not inherently related to any particular computer architecture. The techniques may be implemented using any known or convenient programming language, whether high level (e.g., C/C++) or low level (e.g., assembly language), and whether interpreted (e.g., Perl), compiled (e.g., C/C++), or Just-In-Time (JIT) compiled from bytecode (e.g., Java). Any known or convenient computer, regardless of architecture, should be capable of executing machine code compiled or otherwise assembled from any language into machine code that is compatible with the computer's architecture.

As used herein, the term "embodiment" means an embodiment that serves to illustrate by way of example but not limitation.

It will be appreciated to those skilled in the art that the preceding examples and embodiments are exemplary and not limiting to the scope of the present invention. It is intended that all permutations, enhancements, equivalents, and improvements thereto that are apparent to those skilled in the art upon a reading of the specification and a study of the drawings are included within the true spirit and scope of the present invention. It is therefore intended that the following appended claims include all such modifications, permutations and equivalents as fall within the true spirit and scope of the present invention.

The invention claimed is:

1. A system comprising:

a title array, embodied in a computer readable medium, that includes a plurality of character strings for provisioning for display in a titlebar or taskbar on a display device;

an interface for receiving an event and for sending a display associated with the event to the display device;

an event processing engine, embodied in a computer-readable medium and coupled to the interface, for processing the event;

a title provisioning engine, embodied in a computer-readable medium and coupled to the event processing engine, for maintaining the title array and controlling which character string of the plurality of character strings to provide for display in the titlebar or taskbar on the display device, wherein at least one of the plurality of character strings serves as a notification of the event.

2. The system of claim **1**, wherein the event is received at the interface through a network from an event server.

3. The system of claim **1**, wherein the event is received at the interface from an input device.

4. The system of claim **1**, further comprising an output device, including the display device, to which a display is sent from the interface, wherein a title associated with at least a portion of the display includes at least a portion of the character string of the plurality of characters strings.

5. The system of claim **1**, further comprising a title generator that generates a title for the display device according to state of a client, wherein the title provisioning engine controls the title generator to allow for the character string of the plurality of character strings to be used instead of the title generated according to the state of the client.

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